the admission of steam into operating-rooms being the principal factor.

Except that I believe an operating-room should be kept at a temperature of from 76 to 78 degrees F., for the reason that a lower temperature abstracts too much heat from the anesthetized patient, I agree entirely with Dr. Rixford's conclusions.

A. J. Ochsner, M. D. (2106 Sedgwick Street, Chicago)—The views expressed by Dr. Rixford correspond so perfectly with mine, and also with my practice, that there is practically nothing that I wish to add except that I have tried both the high, the moderate, and the low temperature. The high temperature as high as 85 degrees F., the moderate in the 70's, and the low temperature from 68 degrees F. to 72 degrees F.

My observations, covering over 40,000 surgical operations, have convinced me that a temperature of between 68 degrees and 72 degrees F. is the best for the patient from every standpoint. The patient never suffers in any way from this temperature; it is the temperature he chooses when not under operation. The surgeon can do better work in that temperature than in any other, and consequently there can be no benefit from the higher temperature, while it certainly does harm by impairing, at least to some extent, the efficiency of the operator and his assistants.

There is one point that I have found of the very greatest importance in the planning of operating-rooms. This consists in having in the ceiling of the operating-room one or more ventilating shafts of the type known as Globe Ventilators. The size of this ventilator should be in proportion to the size of the room. This ventilator does not permit smoke, or any dust, to fall into the room, because, no matter how hard the wind blows or from what direction it comes, it always produces an upward draft. This, of course, is increased by the higher temperature in the room causing the current of air to pass out through the ventilating shaft whenever the outside temperature is below 68 degrees F. When the outside temperature is above 68 degrees F. the ventilation should be increased by the opening of windows in a manner not to produce a draft on the patient.

In this way the patient and everyone else in the operating-room breathes pure air at the most desirable temperature, and I am convinced that absolutely no harm can come from exposure of the tissues if they are properly cared for.

E. Starr Judd, M. D. (Rochester, Minn.)—The question of the temperature to be maintained in an operating-room during an operation has been seriously considered in the past, but largely owing to the sensible attitude of some of the earlier American surgeons a high degree of temperature has been shown to be not only unnecessary but often detrimental. As Doctor Rixford and the others who have discussed this subject have maintained, from 72 degrees to 76 degrees F. is a comfortable temperature for patient and operator, and is undoubtedly the temperature to be preferred. It is well known that when a patient is shocked the application of heat is most important, but, as Doctor Rixford has said, the cause of the shock, such as hemorrhage or trauma, is always well known at the time.

Pulmonary complications are more likely to occur if the patient leaves the operating-room in a heavy perspiration, particularly if it is not possible to prevent exposure to a draft. During the operation, or in the first few hours afterward, a draft of air is much more likely to be the cause of trouble than almost any degree of cold air without the draft. It has been noted in the Mayo Clinic that pulmonary complications are much more likely to occur during epidemics of respiratory tract infections. Such patients enter the hospital unaware of the fact that they have the infection, which becomes active when their resistance is temporarily interfered with at the time of the operation. During certain times of the year there are absolutely no signs of respiratory tract infections.

Patients operated on for lesions of the stomach are more prone to pulmonary complications than all other patients combined. The possibility of embolus from the walls of the stomach to the lungs as the source of the complication, has been considered, and also of the staying of the diaphragm during operations on the stomach. Patients who have been operated on for gastric lesions are also more likely to inhale and aspirate infected mucus from the nasopharynx than are patients during other types of operations. Any patient having an infection in the nose or throat should be treated before serious operation is undertaken.

Shock and pulmonary complications are no more likely to follow an operation performed in a comfortably heated operating-room than in one in which the temperature is very high. The patient must be protected against drafts both during the operation and during his convalescence.

CLOSING NOTE BY THE EDITOR

If this discussion only succeeds in focussing attention upon the facts about one of the thousand and one details connected with the practice of medicine, it will have been well worth while.

As a matter of fact, it will do much more. I am optimistic enough to believe that it will result in increasing comfort for patients, doctors, and nurses, and perhaps sometimes preventing pneumonia and possibly saving life.

If others have worth-while questions they would like to have a composite medical opinion about, send them in to CALIFORNIA AND WESTERN MEDICINE.

CARBUNCLE OF THE KIDNEY

By CHARLES P. MATHE, M. D., San Francisco
(From the Department of Urology, Saint Mary's Hospital, San Francisco, California)

Carbuncle of the kidney resembles carbuncle in other places in the body. It is a suppurating inflammatory process secondary to some primary staphylococcic infection in the skin or elsewhere.

Careful complete study will supply sufficient reliable evidence from which to make a positive diagnosis.

One complete case report.

The treatment is surgical.

Illustrations by Ralph Sweet.

For references consult the Index Medicus or the Quarterly Cumulative Index of the A. M. A.

DISCUSSION *by Laird M. Morris, San Francisco; H. A. Rosenkranz, Los Angeles; Robert V. Day, Los Angeles; L. P. Player, San Francisco, and the author.*

Carbuncle of the kidney may be defined as a circumscribed infectious inflammation, with the formation of multiple foci of necrosis, often ending in a suppurating slough. It is secondary to staphylococcic infections elsewhere in the body, usually manifested in the skin. It simulates a subcutaneous carbuncle.

In 1894 Israel pointed out that kidney carbuncle existed as a clinical entity, and observed its similarity and relation to carbuncle of the neck. Later, Jordan, Zinn, and Barth, in Germany, and McWilliams, Eisendrath, Fisher, Kretschmer, and Furniss, in this country, reported additional cases presenting its typical pathological picture. One must not confuse kidney carbuncle with single or multiple renal abscesses or with acute septic infarct of the kidney in which the kidney is studded with multiple minute abscesses. In these, as in perinephritic abscess, the infection enters by the blood stream. The carbuncle usually develops in the cortex of the kidney near the capsule with a larger central abscess gradually increasing in size surrounded by smaller, more minute abscesses. As the pathological process progresses, these may become more or less confluent, producing a large renal abscess.

The portal of entry is through the blood stream. The original site of entrance of the staphylococcus aureus is usually in the skin or bone. It may be a furuncle, carbuncle of the neck or gluteal region, felon, osteomyelitis, or paronychia. This original

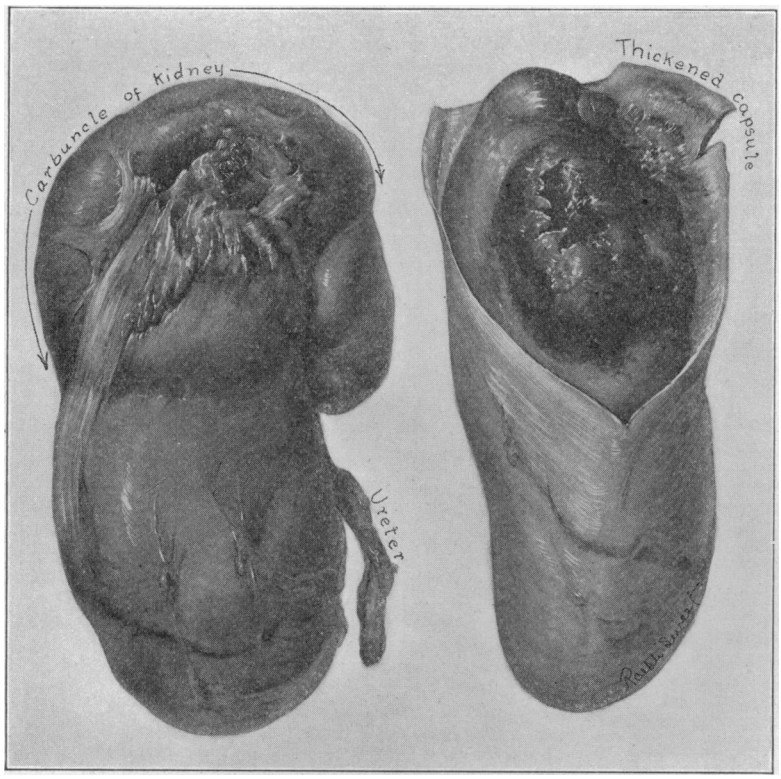

PLATE I

Left—Enlarged upper pole with thickened adherent capsule.
Right—Capsule split, demonstrating hemorrhagic area with central necrosis.

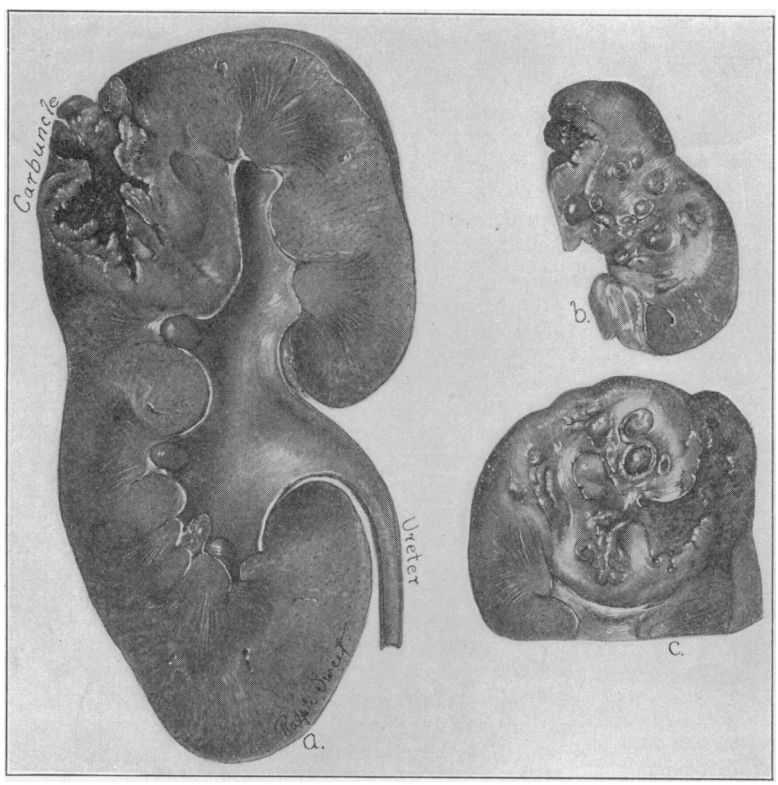

PLATE II

Left—(A) Sagittal section through carbuncle, showing encroachment on upper primary calyx with corresponding elongation.
Upper right—(B) Cross-section through the periphery, showing numerous small abscesses.
Lower right—(C) Deeper section, showing central necrosis and adjacent abscesses.

focus may be so slight that it escapes the observation of the patient and can even be overlooked by the attending physician. The organisms enter the blood stream, and a culture of the blood at some time or other, usually early, would reveal its presence. In the case herein reported, staphylococcus aureus was cultured from the blood before and after operation. In 1899 Schnitzler pointed out the fact that organisms may enter the body and not infect the individual, but in the event of trauma, localized infection may ensue. This local infection can later give rise to further metastatic and general infection. In 1897, Busquet reported a case of abscess of the right kidney. The patient fell from a wagon on his back, traumatizing the kidney. Later, following a furunculosis of the arm, a renal abscess developed which was successfully opened and drained.

It might naturally be inferred that these blood infections of the kidney would produce bilateral lesions. Israel, Simon, Brewer, and others emphasize the large number of unilateral cases because of diminished resistance (locus minoris resistentiae) of that particular organ as a result of previous disease or injury. This frequent unilateral lesion offers the possibility of relief by early correct surgical interference. The organisms transmitted from this original focus lodge in an end artery of the kidney, usually in a glomerulus in the cortex near the renal capsule, and thus the development of renal carbuncle is started. As the pathological process continues, a circumscribed infection of the adjacent renal cortex takes place, with fibrinous exudation, multiple foci of necrosis arises, the tissue adjacent to each necrotic plug becomes gangrenous. The entire circumscribed inflammatory area can develop into a suppurating slough and extend through the renal capsule, setting up a secondary perinephritic abscess. Rehn calls attention to the fact that the organisms may lodge in the perirenal fat first, carried by the artery capsuloadiposae, start an abscess which may remain as a perinephritic abscess or extend to the kidney secondarily and give rise to renal infection.

In my case of renal carbuncle

the primary focus was in two boils under the right jaw-bone. Staphylococcus aureus was demonstrated in the blood prior to operation and in the kidney after nephrectomy, and as there are not many such cases reported in the literature, I herewith present this case.

Miss C. H., age 23, kindergarten teacher. Referred by Doctors Orr and Ryer. Admitted to St. Mary's Hospital November 30, 1923.

On September 30, 1923, the patient was treated by Doctors Montgomery and Culver for pustules on the skin covering the right jaw-bone and on the upper lip. The superficial crust of the pustules was removed, followed by the application of boric acid compresses. On October 3, 1923, two boils developed under the right jaw-bone, attaining the size of an almond. These drained slightly and closed quickly, disappearing in a few days. The following three weeks were characterized by malaise, loss of appetite, and lack of ambition. On October 31, 1923, the patient noted, after taking a hot bath, a dull aching pain in the right lumbar region, non-radiating in character, but persisting for three days, at the end of which time it became very sharp and intermittent in character, coming every three to six hours and lasting two to three minutes. On the evening of the fourth day, a high fever developed, lasting two days. These attacks of pain were accompanied by nausea and sometimes vomiting. Belching of gas was also noted. There was also slight dysuria and increase in frequency of urination with nycturia 1 to 2. No hematuria, calcuria, nor cloudy urine was observed.

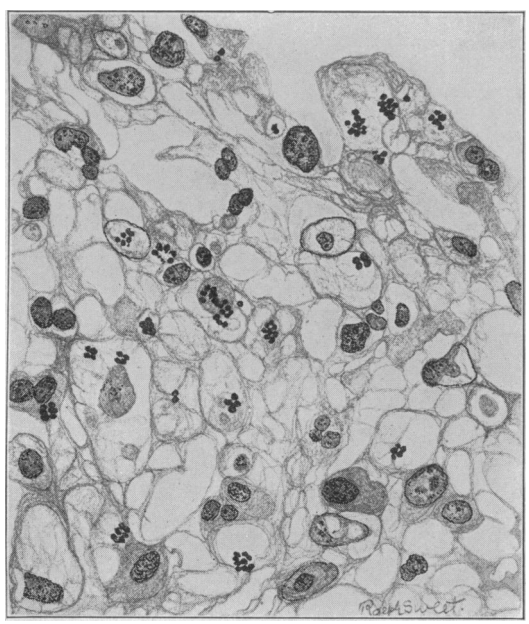

PLATE III

Section of wall of abscess, showing staphylococcus aureus in plasma cells and polymorphonuclear leukocytes. In this area the renal tissue is completely destroyed.

Physical Examination—Head and heart negative. On the neck one sees the scars of two healed boils under the jaw-bone. Blood pressure—systolic, 100; diastolic, 50. In the chest, a few moist rales and tubular breath-sounds are heard over both apices. In the upper right abdominal quadrant a very tender, rounded, regular mass, resembling the lower pole of the right kidney was palpated, which moved with respiration. The overlying muscles were somewhat rigid. Tenderness and bulging was observed in the costo-vertebral angle.

Laboratory — Blood examination: Hemoglobin, 60 per cent; erythrocytes, 3,664,000; leucocytes, 18,100; polymorphonuclear leukocytes, 72 per cent; small mononuclear lymphocytes, 20 per cent; large mononuclear lymphocytes, 8 per cent. Blood culture shows staphylococcus aureus. Blood chemistry: Urea nitrogen, 12.5 mg. per 100 cc.; nonprotein nitrogen, 23.7 mg. per 100 cc.; and creatinine, 1.6 mg. per 100 cc. Catheterized specimen of urine shows no acid-fast or other organisms in the stained smear. A faint trace of albumin and an occasional leukocyte seen. Phenol sulphone phthalein test (intramuscular) 67½ per cent recovered in two hours.

X-ray examination reveals an enlarged right kidney with no evidence of stone in either tract. Pyelogram on the right side shows a narrow pelvis with elongation of the upper primary calyx. There is blunting of the minor calices of the upper two primary calices. A pocket-like defect is seen medial to the upper primary calyx. There is marked kinking of the ureter at the uretero-pelvic junction.

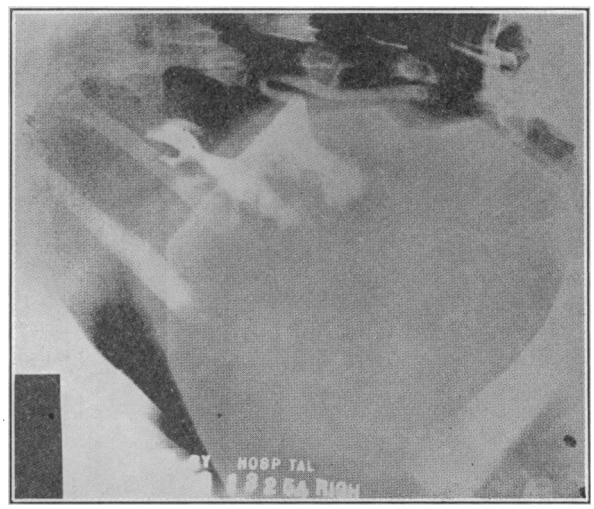

Figure 4—Pyelogram demonstrating elongation of upper primary calyx.

Cystoscopy, December 1, 1923. There is moderate injection of the trigone and right ureteral orifice. The mucosa in all three bladder zones is very pale. Both ureters catheterized with ease. The following is the individual kidney and bladder catheterized findings:

	KIDNEY		BLADDER
	RIGHT	LEFT	
Macroscopic	Clear + shreds	Clear	Clear + shreds
Erythrocytes	Occasional	None	None
Leukocytes	Occasional	None	Occasional—1-4 to H. D. F.
Casts	None	None	None
Ep thelium	5-6 to H. D. F.	1-2 to H. D. F.	6-8 to H. D. F.
Stained smear	Few gram + cocci	Few gram + cocci	Few gram + coc
Culture	Staph. aureus	Staph. aureus	Staph. aureus
Phthalein app. time (intravenous)	2½ min.	2½ min.	
1st 15 min.	20%	25%	
2nd 15 min.	5%	10%	
	25%	35%	

Operation—Nephrectomy. The usual curved linear lumbar incision was made on the right side. On opening gerota's capsule, 60 cc. of clear serum exuded. The kidney was found to be densely adherent to the surrounding structures, particularly in the mesial portion of the upper pole. It was also enlarged, and on the anterior mesial aspect of the upper pole was found a tumor mass 5 cm. in diameter. The center of this mass was softened and necrotic with pus exuding, thereby dissecting away the upper third of the true kidney capsule which was not perforated. Through the capsule one could see a collection of sanguino-purulent fluid in which numerous large white flakes were seen. The pedicle was then clamped and tied off with No. 2 catgut and the kidney removed, care being exercised not to rupture the renal capsule containing the pus.

PATHOLOGICAL DESCRIPTION

Kidney: S. 24,215. Miss C. H.

Gross Description — Weight, 160 grams. The

TABLE 1

Reference Author	Sex	Age	Initial Lesion	Time Between Initial Lesion and Renal Symptoms	Symptomatology	Urine Findings	Organisms	Function Study	Treatment	Specimen at Autopsy or After Operation	Results
Israel	Male	43	Carbuncle of neck.	Simultaneously	1–Fever. 2–Pain and swelling on left.	Trace of albumin. Few W. B. C. Hyaline cast.	Staph. aureus		Incision and later nephrectomy 4 weeks after symptoms.	Carbuncle of posterior upper pole—2½ cm. Perirenal abscess.	Recovery
Israel	Male	----	Furunculosis	One month	1–Stormy paranephritis. 2–Fever. 3–Pain and swelling (location not given).	Not reported	Staph. aureus		Operation 5 weeks after onset of symptoms. Incision and drainage. Later excision of carbuncle.	Carbuncle of posterior upper pole. Kidney.	Recovery after a month.
Israel	Male	37	Carbuncle of neck.	23 days	1–Fever 39.9. 2–Pain and swelling in left flank—swelling came later.	Trace of albumin. Many W. B. C. Few R. B. C.			Nephrectomy	Carbuncle surrounded by small abscesses in middle posterior part of left kidney.	Recovery after pneumonia. Pleurisy and rib resection for empyema.
Jordan	Male	36	Gluteal carbuncle.	Simultaneously	1–High continued fever. 2–Pain and swelling bilat., especially on right.	Negative.	Staph. aureus		Incision and drainage	Carbuncle on posterior surface right kidney; "pigeon-egg size" beneath capsule.	Recovery
Jordan	Female	24	Paronychia of middle finger.	2 or 3 weeks	1–High continued fever. 2–Pain and swelling on right.	Negative.	Staph. aureus		Incision and drainage 2 weeks after onset.	Carbuncle right kidney, size of small apple, upper pole posterior. Perirenal abscess.	Recovery
Jordan	Male	27	Laceration of finger. Infected a number of weeks.	Concomitant	1–Fever. 2–Pain in left hypochondrium. 3–Swelling 10 weeks after onset in left lumbar region.	Negative.	Staph. aureus		Incision and drainage weeks after symptoms began.	Perinephritic abscess. Kidney not examined. Reported as carbuncle.	Recovery
Jordan	Male	----	Gluteal furuncle	1-2 weeks	1–High fever. 2–Bilateral pain and swelling over kidneys, especially on right. 3–Swelling on left subsided spontaneously 4 days post-operative.	Negative.	Staph. aureus		Incision and drainage of right kidney only.	Renal carbuncle upper pole. Right kidney.	Recovery 6 weeks.
Barth	Male	10	Unknown	First symptom. First knowledge that boy was ill.	1–Chills and fever. 2–Pain and swelling on right.	Normal until time of second operation; then few R. B. C. and W. B. C.	Staph. aureus		1–Incision and drainage. 2–Two weeks later resection of carbuncle.	Carbuncle of upper pole of right kidney.	Recovery in 2 months.
Barth	Male	21	Unknown. Later, post-operative, a prostatic abscess was found.	First symptoms	1–Fever 38.5° C. 2–Pain in right flank. 3–Swelling.	Right Kid. Few W. B. C. Cocci and rods Left Kid. Few R. B. C. No bacteria	Not definitely determined.	Right App. time 1.12 Phloridizin Sugar in 23 min. Left App. time 1.69 Phloridizin Sugar in 10 min.	Incision and later nephrectomy—right.	Carbuncle 7x3 cm. in middle of posterior surface of right kidney. Examined 10 years later.	Recovery in 2 months.
Barth	Male	28	Not given	First symptoms	1–Fever 39°-40° C. 2–Pain and swelling on right.	Albumin—W. B. C., R. B. C. and casts.	Staph. aureus	Right Indigo None Left Carmine App. in 8 min.	1–Incision and drainage 3 weeks after onset. 2–Nephrectomy 1 week later. Diagnosed "Carbuncle."	Carbuncle of lower pole of right kidney size of apple.	Recovery in 3 months.
Barth	Male	34	Gluteal furuncles bilateral; squeezed, not incised.	Symptoms appeared about time of second furuncle.	1–High fever 40° C. 2–Pain and swelling in right flank.	Negative. Later a few R. B. C.; then trace of albumin. Few R. B. C., W. B. C. and staph.	Staph. aureus	Right Indigo None after 35 min. Left Carmine App. in 10 min.	1–Incision and drainage. 2–Two weeks later nephrectomy. Diagnosed "Carbuncle."	Carbuncle 5x4 cm. on convex border.	Recovery. Patient developed pneumonia postoperative.

TABLE 1 (Continud)

Reference Author	Sex	Age	Initial Lesion	Time Between Initial Lesion and Renal Symptoms	Symptomatology	Urine Findings	Organisms	Function Study	Treatment	Specimen at Autopsy or After Operation	Results
Zinn	Male	26	Furuncle on side of nose.	2-3 weeks later	1–Fever to 40° C. 2–Pain and swelling right renal region.	Negative to time of operation.	Staph. albus and aureus.		Incision and drainage of right kidney two weeks after onset of symptoms.	Thrombosis of venacava and iliacs. Carbuncle of upper pole right kidney extending to liver.	Died 4 days post-operative.
Zinn	Male	25	Furunculosis of neck.	4 months later	1–High fever (39-40°) coming suddenly. 2–Pain and swelling right renal region.	Negative to about time of operation; then albumin trace. Few R. B. C. and W. B. C. Occ. hyaline cast.	Staph. aureus		Incision and drainage 3 weeks after onset.	Carbuncle upper pole with perirenal abscess.	Complete recovery 8 weeks post-operative. Thrombas of left leg. Hearing disturbed.
Zinn	Male	55	Carbuncle of neck. Excised by cautery.	3 weeks	1–Intermittent high fever. 2–Pain and swelling (renal region). 3–Chills.	Trace of albumin. Few R. B. C. and W. B. C. Occ. hyaline cast; rods and cocci.	Staph. aureus		Incision and drainage 2-3 weeks after onset.	Carbuncle of upper pole and perirenal abscess.	Complete recovery after 6 weeks.
Zinn	Female	24	Furuncles on left arm.	1 week	1–Chills and fever. 2–Pain and swelling (renal region). 3–Loss of weight, 5 kgm. in 2 weeks.	Albumin trace. Few R. B. C., W. B. C. and hyaline casts. Few organisms appeared fairly late.	Staph. aureus		Incision and drainage 4 weeks after onset.	Carbuncle upper pole with perinephritis.	Complete recovery after 2 months.
Furniss	Female	—	Boil on neck	14 days	1–High temperature. 2–Sick feeling. 3–Pain in left renal region and border of ribs.	Few pus cells		Indigo carmine delayed left side.	1–Drainage perinephr tic abscess. 2–Nephrectomy.	Lower pole carbuncle size of walnut with numerous openings containing pus.	Recovery
Fisher	Male	24	Infection on left index finger.	3 weeks	1–Fever 103.4°. 2–Pain right lumbar region. 3–Large swelling. 4–Pulse 140.	Albumin trace. Few pus cells.	Staph. aureus		1–Drainage of perinephritic abscess 3 weeks later. 2–Nephrectomy.	One-half upper pole kidney necrotic.	Relieved
McWilliams	Female	38	Abscess of left index finger involving bone.	3 weeks	1–Pain right lumbar region and abdomen. 2–Increased frequency. 3–Chills; fever. 4–Temp. 103°, pulse 102. 5–Leucocytosis 14,800.	R. K. Few pus cells. L. K. Few pus cells.	Staph. aureus	60%—2 hours	Nephrectomy		Recovery
Eisendrath	Male	—	Furuncle; carbuncle of neck.	6 weeks	1–Pain in right lumbar region. 2–Fever. 3–W. B. C. 27,000. 4–Pulse high.	Negative.	Staph. aureus		First, opening of perinephritic abscess; later nephrectomy.	Carbuncle lower pole.	Recovery
Kretschmer	Female	35	Felon right thumb incised; necrotic bone removed.	7 months 5 weeks	1–Constant dull pain left side, not associated with urination. 2–Abdominal colic. 3–Nausea. 4–Frequency of urination. Leukocytosis 14,400.	R. K. and B. No pus cells. Culture R. K. sterile. Bladder—Colon B. No. T. B.	Hemolytic staph.	58%—½ hour	Nephrectomy	Carbuncle anterior surface left k dney.	Recovery
Kretschmer	Male	34	Carbuncle of neck incised and drained; healed.	1 month	1–Slight pain lower abdomen. 2–Temperature 104.6°. 3–Nausea and vomiting. 4–Hematuria. 5–Frequent urination. 6–Dysuria. 7–Leukocytosis 16,800.	B., 110 W. B. C. R. K., 1050 W. B. C. L. K., 230 W. B. C.	B., staph. aureus R. K., staph. aureus L. K., sterile	R. K. 20% L. K. 26%	Nephrectomy	Large carbuncle posterior surface upper pole right kidney.	Death

capsule strips readily leaving a smooth surface marked by remains of foetal lobulations, except at the upper pole where there are firm adhesions and thickening of the fibrous capsule. In this region there is an elevated hemorrhagic area in the cortex, fairly sharply defined and measuring 5 cm. in diameter. Section through this area shows the hemorrhagic zone extending 2 cm. into the depth of kidney. In the center there is necrosis and hemorrhage, forming an irregular cavity about the hemorrhagic area, and diffusely scattered throughout the upper pole there are many small, irregular, yellowish foci suggesting minute abscesses. The rest of kidney parenchyma shows no gross changes except cloudy swelling.

Microscopic Examination — Sections from the main abscess show a hemorrhagic necrotic wall with no tendency to walling off. Other sections from the upper pole show minute abscesses and a diffuse acute and subacute inflammatory reaction with numerous foci of polymorphonuclear leukocytes and plasma cells. In other areas granulation tissue is found. Certain other areas show large groups of hyaline connective tissue, lymphocytic and wandering cell infiltration. Sections stained by modified Gram's method show the presence of numerous staphylococci.

Diagnosis—Carbuncle upper pole of kidney.

Post-operative Course — For three days after operation staphylococcus aureus was continuously found in the blood, after which time the blood was sterile to culture. The lumbar incision developed numerous boils at the site of each of the skin sutures. These readily cleared up with the application of mercurochrome 220 (1 per cent). The wound drained for four weeks and finally closed. Temperature gradually dropped and was normal on the twenty-second day. The patient was discharged from the hospital January 10, 1924, much improved. The weight had increased from 86 to 105 pounds, and since then to 126 pounds. The appetite and strength have returned.

FREQUENCY OF OCCURRENCE

Considering the frequency of skin infections, such as pustules, boils, carbuncles, felons, paronychia, and their relation to the etiology of cortical abscesses of the kidney, one is surprised at the infrequency of renal carbuncle. Many are no doubt overlooked, either being mistaken for a co-existing perinephritic abscess, a renal abscess or an acute septic infarct of the kidney. In some cases, however, due to delayed surgical interference, the renal carbuncle has developed into a kidney abscess. In twenty-two cases in which the sex is stated, sixteen occurred in males, and six in females. Fifteen cases occurred between the ages of 20 and 40, one at 10, one at 45, and another at 55, and in four cases the age was not reported. In eleven cases, the right kidney was involved, in eight the left, in two cases both, and in one the kidney affected was not stated.

TABLE II

TABLE OF OCCURRENCE OF RENAL CARBUNCLE

Right kidney	11 cases
Left kidney	8 cases
Bilateral	2 cases
Not stated	1 case
Total	22 cases

TABLE III

TABLE OF INCIDENCE ACCORDING TO SEX

Male	16 cases
Female	6 cases
Total	22 cases

TABLE IV

TABLE OF INCIDENCE ACCORDING TO AGE

10-20	1 case	(10 years)
20-30	9 cases	
30-40	6 cases	
40-50	1 case	(45 years)
50-60	1 case	(55 years)
Not stated	4 cases	
Total	22 cases	

SIGNS AND SYMPTOMS

The symptoms may be divided into (1) "General" and (2) "Urological."

General—The individual is usually acutely ill. There is a high fever which may or may not be ushered in by a chill. Fever is a constant symptom, being present in all the reported cases. It is usually very high—39-40 degrees (C) in the cases reported in Germany, and as high at 104.6 degrees "F" (Kretschmer) in this country. It may be intermittent or continual. Loss of weight and appetite, malaise and asthenia, etc., which are common to all inflammatory processes, are likewise present. Leukocytosis is constant, and varies from 14 to 27,000. In this case it was 18,000.

Urological—There is usually pain and tenderness in the involved lumbar region. The pain may radiate anteriorly to the abdomen, but does not seem to extend to the labia in women and testes in men as frequently as seen in the renal colic associated with a block in the ureter due to a stone, kink or stricture of the ureter. The pain may be continual, cramp-like, dull or cutting, associated with nausea and vomiting. It also may be intermittent with gas and belching, supplanting the nausea and vomiting during the remissions. The costo-vertebral angle is usually tender. There may be actual bulging or tumefaction of the affected side, accompanied by rigidity or spasticity of the overlying musculature. Oftentimes the urinary symptoms are so slight that the attention of the physician is drawn away from the urinary tract. Other times there is some increase in frequency, dysuria, and hematuria. The urine findings are such as one would encounter in any acute septic infection, such as pneumonia, typhoid fever, etc. The usual picture is an occasional leukocyte and erythrocyte, a slight trace of albumin and organisms in no great number. In fact, in studying the patient, one remarks the relative paucity of urinary findings in proportion to the severity of the illness. This can be explained by the fact that the occurrence of the carbuncle is first in the renal cortex near the capsule not communicating with the renal pelvis. The carbuncle, however, may increase in size, point toward the renal pelvis, and eventually rupture through, giving findings on the affected side indicating a pyogenic infection of the kidney. Again I wish to emphasize the urine findings as important by being relatively negative in comparison to the degree of illness of the patient.

Diagnosis — The pre-operative diagnosis is extremely difficult when one observes that, in the twenty-two reported cases, only four were diagnosed prior to operation (Kretschmer, two cases; Barth,

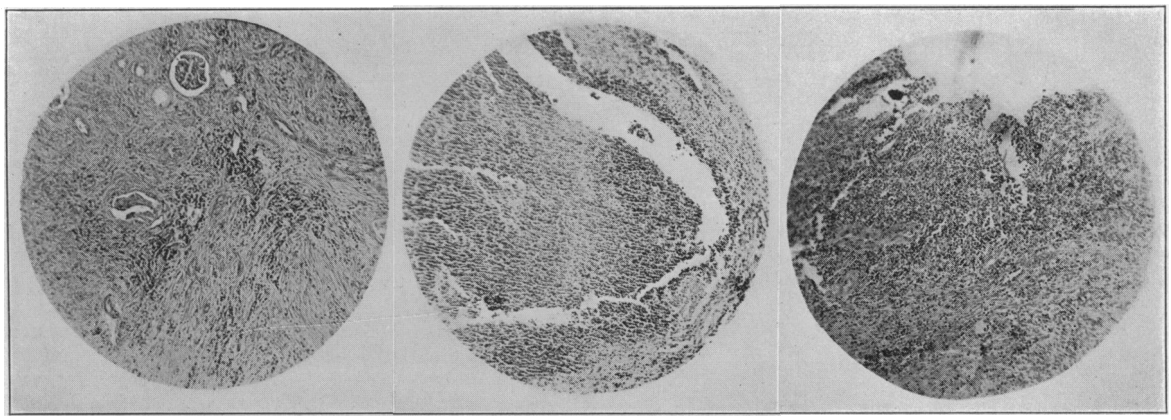

Figure 1—Section of the carbuncle, showing a large hemorrhagic area w th necrosis in its center. Leitz Oc. 1, Obj. 3.
Figure 2—Section showing one of the numerous foci of necrosis. Leitz Oc. 1, Obj. 3.
Figure 3—Section with hyaline connective tissue, lymphocytic and wan- dering cell infiltration. Leitz Oc. 1, Obj. 3.

two cases). A careful history relating the appearance of pain and swelling occurring in either lumbar region at a variable period anywhere from several days to several months, following a skin infection accompanied by high fever and leukocytosis, with relatively negative urine findings and symptoms, is of great importance and aid in determining the diagnosis. However, as skin infections are also responsible for perinephritic abscess, acute septic embolic kidney, kidney abscess multiple or single, it is almost impossible clinically to distinguish one from the other. Pyelography may be of some assistance. If the carbuncle has attained a large size, the primary and secondary calices may be elongated in that portion of the kidney, or there may be a pressure defect in the pelvis. A good plain plate should show an aberrant kidney outline.

TREATMENT

If the renal carbuncle is found early, simple incision and drainage may suffice to relieve the condition. This method was utilized by Zinn, in four cases (one which died four days later). Israel incised two of his cases, but was obliged to later do a nephrectomy in one and a resection in the other. Barth incised four carbuncles, and later was obliged to do a nephrectomy in three, and a resection in one. Jordan, however, reports four successful cases, in which the treatment was simple incision and drainage.

If the carbuncle is of long standing and it has attained such a size that resection cannot be employed, nephrectomy is the treatment of choice. This was utilized in our case. In the reported cases, excepting in the case of bilateral involvement, this method was without mortality, and in all cases brought ultimate relief to the patient. Nephrectomy also has the advantage of being followed by fewer complications than incision or excision.

It is well to bear in mind that, in opening a perinephritic abscess, the original focus may be a renal carbuncle. In five of the cases reviewed herein, the true pathology was not recognized at the time of operation, but on the persistence of the symptoms nephrectomy was made at a later date.

It may be well to note in passing that Souper reports a bilateral staphylococci pyelonephritis following a gunshot wound of the thigh that was cleared up by the use of large and frequent doses of autogenous vaccines. Jordan describes an interesting case in which there was bilateral pain and swelling over both kidneys, more marked on the right side. After incision and drainage of a carbuncle in the right kidney, the pain and swelling in the opposite side subsided four days later.

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DISCUSSION

Laird M. Morris, M. D. (240 Stockton Street, San Francisco)—The complications of staphylococcus skin infection are quite characteristic and include, beside acute bacterial endocarditis, certain internal suppurative conditions, the principal of which are acute osteomyelitis, perinephritic abscess, kidney carbuncle, and acute myositis. The case of kidney carbuncle so thoroughly presented to us by Doctor Mathe is an excellent demonstration of the localization of staphylococci in the kidney substance proper without pus formation in the perirenal tissue. On the other hand, groups of cocci may lodge in the cortical region and a minute abscess extend to the periphery, thus involving the perirenal tissue and cause perinephritic suppuration. These are examples of intermittent blood-stream infection from a distant focus.

Trauma, as so correctly brought out by Dr. Mathe, is important as a means of localizing staphylococci to the part of lowered resistance. This is certainly true of acute pyogenic osteomyelitis, kidney abscess, and, to a lesser degree, of muscle abscess.

A history of boils or carbuncle followed at unstated interval of time (weeks or months) by symptoms of toxemia referable to the kidney region should cause one to consider the possibility of a staphylococcus infection of that organ either in the kidney substance proper, the perirenal tissue or a combination of both.

I wish to congratulate Dr. Mathe on this excellent presentation and the authentic review of the literature.

H. A. Rosenkranz, M. D. (Story Building, Los Angeles)—Doctor Mathe has made a distinct contribution to the literature on renal infection, and his emphasis on the etiology of renal carbuncle has opportunely indicated to us the necessity of taking into consideration infections of the skin, bones, etc., whenever the patient complains of acute renal or perirenal symptoms. Perhaps the condition most likely to be mistaken for carbuncle is acute unilateral pyelonephritis, especially that severe form complicated by renal or ureteral calculus. The lack of definitely positive urinary findings, however, should certainly cause one to consider carbuncle. I have found the aspirating needle invaluable in ruling out perinephritic abscess. There is another rare condition that should be considered, namely, pneumonia of a lower lobe, which, I have in one case observed to strongly simulate a renal, and in another case an appendiceal condition.

In about the year 1912 I saw Willie Israel, son of the father of kidney surgery, demonstrate before the Berlin

Urological Society, a case of carbuncle of the kidney. I recall that the carbuncle was very large, involving about one-half of the organ. The patient was cured by nephrectomy, which I consider to be the only safe treatment. An acute destructive infection of the kidney, I have been taught by a number of experiences, is a condition that may not be treated expectantly. The virulence of the infection cannot be gauged, neither can the resistance of the patient, but the mortality of septicemia resulting from this condition is high, and nephrectomy in order to remove the primary focus of infection should, I feel, be not delayed.

Robert V. Day, M. D. (Detwiler Building, Los Angeles)—I am sure I speak for everyone in this section, in saying that Doctor Mathe's presentation of this subject with a case report is a classical one and equals anything in the literature. Different organisms have favorite sites in the kidney for their attack. While tubercle bacilli and streptococci are apt to first invade the medulla, it is a well-known fact that staphylococci have a predilection for the extreme cortex of the kidney directly underneath the true capsule. Oftentimes the infection is a mixed one and the primary organisms may not be found after the disease has progressed for a short time; for instance, if careful Gram stains of the centrifugalized sediment from a freshly catheterized specimen of urine are made, streptococci with some colon bacilli will be found in the beginning of the attack and later on colon bacilli only, but these in great numbers. Streptococci are probably often present preceding or co-incident with the presence of the staphylococci in the blood stream or urine. Rosenow's work and views in regard to this seem to be the only hypothesis that explains our clinical findings. I am inclined to believe that, in some of these so-called carbuncles of the kidney with sloughs, streptococci have been present and have disappeared just as they usually do in the so-called colon bacillus infections of the kidney for which the colon bacillus is probably not responsible at all, and is simply a secondary invader—possibly antibiotic. We see so often in streptococcus cases of the kidney great destruction of the kidney substance and occasionally frank sloughing.

The so-called carbuncle of the kidney is in no way different from any other pyogenic hematogenous infection, except by the combination of abscesses and sloughs. Therefore, for the sake of simplicity in nomenclature, I think we should discard the term entirely, even though a great urologic genius—Israel—using his imagination, saw fit to term this condition carbuncle of the kidney and no one has seemed to possess the temerity to criticize it. It would be about as rational to speak of tonsillitis of the kidney in certain conditions with streptococcic infection with the primary focus in the tonsil. In the first place, a carbuncle is not a hematogenous infection, but is due to direct action of micro-organisms in the sebaceous and sweat glands and the hair follicles. It (carbuncle of the kidney) is probably many times more common than is indicated by the number of case reports, and this for the apparent reason that the vast majority of men operating upon these kidneys do not recognize the classification and hence fail to report them. I recall five cases that could be well classified under carbuncle if we follow Israel's nomenclature. Not infrequently a perinephritic abscess is secondary to such a process and, had the patient been subjected to surgery sooner, one would have found the infection confined within the true capsule of the kidney.

Regarding urinalysis: One may say that, even in the absence of pus in the urine, one almost always finds at least a trace of albumin and usually staphylococci if a Gram stain is made of the sediment of a freshly catheterized specimen of urine. Cultures are notoriously inaccurate, for the reason that they frequently are contaminations and, if bacteria are present and of renal origin, they are seldom missed after a carefully made Gram stain and careful search. About the only place for cultures in examination of urine is to positively identify organisms found by staining.

Doctor Mathe's patient had a history of trauma, which was probably responsible for the lowered resistance in this kidney; we must remember, however, that the most common and important cause of trauma in the kidney is back-pressure, and this invariably predisposes to infection.

Lionel P. Player, M. D. (380 Post Street, San Francisco)—Dr. Mathe's paper is a valuable contribution to medical literature, and he is to be congratulated upon his presentation of the subject. His review of the literature has enabled him to correlate and chart concisely some important data. The history and investigation of his own case is quite complete.

The urological, x-ray, and laboratory findings prove the difficulty encountered in an attempt at differential diagnosis from closely related renal or perirenal conditions, but serve to emphasize the importance of a urological study of cases presenting signs and symptoms of toxemia during or at any time following an acute staphylococcus skin infection, with only slight symptoms referable to the kidneys.

Treatment, according to the statistics collected by the author, is surgical removal if a single kidney is involved. If early recognition of kidney carbuncle were possible, certain dyes or their compounds, with other metals or chemicals which are being used in similar conditions with more or less success, might be employed in early monolateral and in bilateral involvement.

Doctor Mathe (closing)—I wish to express my genuine appreciation of the general acceptance of the urologists of this section of the relation of skin infections, such as boils, furuncles, felons, carbuncles, etc., to the formation of nephritic and perinephritic abscesses. Doctor L. Morris points out that internal suppuration may follow abscess formation of the skin at varying intervals of time, even weeks or months. In his recent review of thirteen cases collected at the University of California Hospital he brings out the fact that the peculiarity of the staphylococcus is that it grows ordinarily in clumps and clings together rather than spreads diffusely. These small groups lodge primarily in the glomeruli, and their pathogenicity calls forth abscess formation in the peripheral portion of the cortex of the kidney. Thus, he states, the name of kidney carbuncle has been given to such conditions by Israel.

The term "kidney carbuncle" was coined by Israel because he was struck by the great similarity of the pathological picture to that of the original focus—a carbuncle on the neck of a man 43. In the case herein reported, the pathologist in examining the specimen noted its great similarity to a carbuncle so often seen on the skin. Binnie, in his treatise on Regional Surgery, states that some carbuncles occur as the result of infection of hair follicles by the staphylococcus, others are caused by septic embolism of the subcutaneous arteries. Although the term "kidney carbuncle" may not be technically correct, it has been accepted and used by Israel, Jordan, Barth, Eisendrath, Furness, and others. Kretschner, in particular, in reporting his two cases states that there is no doubt in his mind of its clinical entity.

The aspirating needle is of great value in the diagnosis of perinephritic abscess, particularly if the abscess is dorsal, above or below the kidney. However, in those abscesses occurring in the fatty capsule ventrad to the kidney between the true renal capsule and peritoneum its use is not without danger. In the diagnosis of carbuncle it is obviously of no value unless the entire lesion has developed into one large slough. Dr. Day has noted that in these nephritic and perinephritic abscesses the urine usually shows a trace of albumen and organisms in the stained smear. There may be, in addition, a few leucocytes and erythrocytes. The point that I wish to emphasize, however, is the relative paucity of the urinary findings in proportion to the severity of the illness of the patient.

Doctors Rosenkrantz and Player have pointed out the importance of nephrectomy in the treatment of renal carbuncle, particularly if advanced. The lesion, although metastatic, acts as a new focus, forming a source of further infection. Statistics have shown that nephrectomy is the treatment of choice, that it has the lowest mortality.

"I am of the opinion, as we all are, that there ought to be no interference with the free exercise and enjoyment of religious profession or worship. But I am also of the opinion that statutory enactments ought not to be contrived to exempt from the just regulation of the occupation of healing those who under the name of religion pursue healing as an occupation for pay" is the opinion of Harry Eugene Kelly, a member of the Chicago bar. *"All persons who hold themselves out to the public as being engaged in the occupation of healing the sick for hire ought to be brought under the regulating statute,* regardless of their religious pretensions, ministrations or connections, and be made to conform to the single statutory standard of education and proficiency."—Federation Bulletin.